

ENABLE READER 4.0

1.0 OVERVIEW OF ENABLE READER 4.0

The Enable Reader 4.0 Speech System is actually two programs in one. The FULL SCREEN SPEECH REVIEW SYSTEM is designed for visually impaired and blind people. With Full Screen Speech Review, a visually impaired person has access to the wide selection of commercial software available for MSDOS compatible machines, such as the IBM PC and dozens of other machines. . Whether it is Wordstar, dBase, or Lotus 1-2-3 , a visually impaired person can now use these programs efficiently.

The second program built into the Enable Reader 4.0 Speech System is the TALKING TUTORIAL PROGRAMMER'S AID. Professional programmers now have access to many of the speech functions of the Enable Reader 4.0 Speech System for writing talking tutorials for their software. This gives blind and visually impaired people the best of both worlds. One, they have access to the Review Mode of the Enable Reader 4.0 Speech System for running commercial software. And two, any program that is written with the Talking Tutorial Programmer's Aid will run for them.

In order to run application programs in any computer, the machine requires a program that will provide a means to communicate between its various parts. This program is called an Operating System. On a computer, the keyboard allows characters to be typed, and the video screen allows them to be viewed. The Operating System connects, or in computer jargon "interfaces", these two parts together with a small routine called the Monitor. When you type a character on the keyboard, the Monitor examines it and then prints it to the screen. Note that, unlike a typewriter keyboard which types characters onto a piece of paper, the computer keyboard does not send characters directly to the screen. The keyboard gives a typed character to the Monitor, and the Monitor may or may not send the character to the screen to be displayed.

In general, the Enable Reader program links to the Operating System, allowing characters typed on the keyboard or printed to the video screen to be intercepted and sent to a special routine. The routine examines the characters before sending them to a speech synthesizer. This is only part of what is needed to give access to blind users. When information is spoken through a synthesizer as it is being printed on the screen, it sounds like a stream of information passing by.

Once the characters have been spoken and displayed, they will not be spoken again. A sighted person can review what has been sent to the screen by just looking at the screen; a blind person has to rely on sound. The Review Mode of the Enable Reader 4.0 Speech Review System gives blind people the ability to GO BACK AND REVIEW ANY DATA ON THE SCREEN BY LISTENING TO IT.

1.1 THE READ MODE AND HOME BASE STRATEGY

In the beginning, the question most frequently asked was "Since the many different computers being used have non-standardized keyboards, don't we have to choose the machine first before the software is developed?" This "Machine Cult Consciousness" approach is only a further disadvantage to the members of the disabled community, since they would have to learn a different review program for each machine they want to work on.

So how can a program be written so that the user does not have to learn a new set of commands if he runs the program on a different computer? Programs written using Control Keys may interfere with systems that use the same keys for other commands. If Function Keys are used, the visually impaired would have to take their hands off the keyboard and grope for the necessary Function Key, and then find their way back to the home row, all without accidentally typing or erasing something.

Primitive drivers that run interactively without locking down the keyboard can be dangerous; if the user accidentally hits a wrong key while giving a command, unexpected results may happen to his work. Blind people may not realize that anything has changed, or at the least will have a hard time restoring their work.

We found that the problem of non-standardization contained its own solution.

The only standardized keys on the microcomputer are the letter and number keys, along with some punctuation characters such as the period and the comma. By using just these "standard typewriter keys" for the Speech Review Routines, the Enable Reader 4.0 program is totally portable and has the potential to standardize one program for almost all micro, mini, and mainframe computers. Once you have learned the Enable Reader Speech System, you will not have to learn different speech review commands to run Enable Reader on other computers.

To provide the security necessary to avoid input mistakes while reviewing, the concept of two modes was born. A user enters a different mode to use the Speech Review Functions, and exits that mode to return to his applications program. Since this second mode is separate and independent from the regular mode, the Speech Review Program can use any keys for its commands, without interfering with the commands of the applications program. By placing all the Speech Review commands inside this second mode, the user can be assured that the keys used by the Speech Review Program will not interfere with ANY program he runs on his computer. This also allows the Speech Review Program to provide as many speech functions as is necessary, with full security, before the user returns to the applications program.

Thus, by implementing both design goals into the Enable Reader program -- Home Row Based Function Keys, and two modes of operation -- full security and standardization have been realized.

The two modes of operation for Enable Reader are:

- 1 INPUT MODE -- For running the Operating System and applications programs. All data typed on the keyboard and/or printed on the video screen is spoken.
- 2 READ MODE -- The Screen Review Mode. It is entered and exited with a toggle key, and uses only Home Row Based Keys to provide more than 40 Speech Review Functions with complete security.

1.2 CATEGORIES OF FUNCTION KEYS

Once the above modes and home row strategy were implemented, the design team was able to type input to the computer and hear it speak. The first problem encountered was not really a problem, because it allowed us to develop our own set of punctuation words. The speech synthesizer which we were using did not contain a full ASCII set of punctuation.

A synthesizer has its own set of words that it speaks when punctuation characters are sent to it. Also, some synthesizers do not have a complete set of punctuation symbols. After listening to other systems, we decided that a Standard Punctuation Set should be designed, whether the synthesizer had one or not. This would allow the user to transfer easily between computers, and between synthesizers as well. The first two keys were the PUNCTUATION OFF and the PUNCTUATION ON keys. They have been upgraded in the MSDOS version of Enable Reader to

be a User Defined Punctuation Filter and a key that has five Punctuation Levels. Thus the Enable Reader Punctuation Set will identify punctuation characters and speak them THE SAME WAY ON ANY SYNTHESIZER. This standardizes one set of punctuation words for all speech synthesizers you might use.

It is somewhat ironic that the third key needed was the QUIT key. We had just gotten the machine to speak when the members of the design group wanted me to give them the means to shut it up. This is where I got my first real lesson in listening to the users, and now I probably use the QUIT key more than any one else when testing new programs.

We soon found that another needed feature was a Letter-to-Word Translation Set. Sometimes a synthesizer's speech quality or pronunciation of a word makes the word hard to understand. A Spell Mode was put into the Enable program, so that words could be spelled out letter-by-letter. Even so, sometimes it was still difficult to understand which letter the synthesizer was

really speaking. (For instance, B as in BEETLE, and V as in VICTOR, are very hard to distinguish.) We needed a set of words that could be spoken in place of letters, in order to identify the letters. Many hours were spent by the users before we came up with a set of words that were representative of the letters, and could be identified when spoken by any synthesizer.

After the toggle to the Read Mode was installed, the brainstorming to develop new keys nearly overwhelmed me. Within a matter of months there were ten, then thirty, then forty. When the users began to use commercial software, a definite pattern emerged -- a set of categories.

The function keys are now divided into six categories. The first five of these are:

- 1 HELP KEYS -- Where the user can query any Function Key to identify itself, turn on or off a word Spell Mode, identify locations on the screen, translate hard-to-understand letters into whole words, designate various levels of Help Words, set punctuation levels and filters, identify capital letters and/or spaces and/or typed control characters.
- 2 CURSOR MOVEMENT KEYS -- Used to position the cursor anywhere on the screen, move up or down a line, move to the home position, or switch between the beginning and end of the current line.
- 3 READING KEYS -- Speaking Keys that speak a letter, a word forward or backward, a line, a window, or a full screen of text.
- 4 COMMAND KEYS -- Needed to send commands to the speech synthesizer to change its style and rate of speech, or make it QUIT speaking.
- 5 SYSTEM KEYS -- Used to turn on or off the video output to the synthesizer, or to type directly to the synthesizer.

1.3 INTEGRATION

When you are running a program, you can go into the Read Mode to review the screen at any time, and then return to the Input Mode to continue with the program. Early in the development of Enable Reader, it became apparent that the Read Mode and the Input Mode were too isolated from each other.

In some applications, you don't have to worry about choosing the screen location where your typed characters will appear. An example is the MSDOS Operating System with its A> prompt. The Operating System prompts you to type in responses at a cursor position that it picks for you. You just type in characters which are then displayed at the cursor position; you are not allowed to change that cursor position, even if you want to. You don't even have to know where the cursor is on the screen.

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Other applications require you to specify where you want your typed-in characters to appear on the screen. In word processing programs for example, you move a cursor around the screen, and then you overtype, insert, or delete characters at the cursor location.

In both of the above types of applications, if you go into the Read Mode to review the screen, you are doing so in order to decide WHAT you will type in when you return to the Input Mode.

In the word processing application, you are also deciding WHERE on the screen your typing will be displayed. For example, once you are back in the Input Mode you will first have to move the cursor to the location of an error before you can correct the error. This locating process can be a time-consuming task for someone who cannot see the screen and has to rely on sound. It involves finding the coordinates of the error, finding the coordinates of the cursor, and trying to move the cursor to the error by counting rows and columns. It involves going in and out of the Read Mode to speak words and characters and cursor locations, to verify that the cursor is where you think it is.

Thus there arose a tremendous need to have Enable Reader automatically handle the locating process. Specifically, when the users found an error while reviewing the screen in the Read Mode, upon returning to the Input Mode they wanted to have the word processing cursor sitting on the location of that error so that they could immediately type in the correction.

This task of integrating Enable Reader with word processing programs proved to be a tremendous programming hurdle. Success was achieved with the version of Enable Reader for the TRS-80 Model 4 running with the Lazywriter word processing program. However, the cursor matchup routine in Enable Reader had to be written specifically for Lazywriter, and thus did not work with any other programs.

Recently, the breakthrough with the MSDOS version of Enable Reader was achieved -- integration with word processor-type programs in general. Now blind computer users can do word processing without the need to know the physical location of the cursor on the screen. They can go into the Read Mode and position themselves audibly; then with a single keystroke they can return to their application and find the cursor positioned with them. Furthermore, the users can easily load in pre-configured tables that contain all the Enable Reader parameters and settings, including the Integration Initialization and screen windows to match the particular word processor that they are using.

In this way, the Enable Reader program in the Read Mode, and a user's application program in the Input Mode, are no longer isolated, but are integrated and work as one program.

Thus, the sixth category of function keys is as follows:

- 6 INTEGRATION KEYS -- Used to initialize the Matchup routine; and to exit the Read Mode, matching up the wordprocessing cursor to the position of the Read Mode Cursor in the process. Also used to load and save Enable Reader Tables.

1.4 DESIGN GOALS

The ENABLE READER 4.0 Project is a program with a unique history. It has gained its reputation by listening to the users BEFORE and DURING the writing of the program.

The Enable Reader Program is not just another common machine-dependent speech review program that offers simple review strategies for blind persons to be able to use microcomputers. The project was initiated with a definite set of design goals that has guided its development through a maze of conflicting, and often contradictory programming problems. It has emerged, after over five years, meeting or exceeding the design criteria.

The design criteria are:

- 1 A properly designed program should have the capacity to become a lifelong learning system that meets the needs of visually impaired people from childhood through adulthood. The program should startup ready to run for the novice, be configurable for the expert user, and include the full set of functions needed to get the beginner through the computer literacy stage to the vocational skills development level.
- 2 All equipment must be off-the-shelf, and ideally be able to be purchased and serviced locally. The program should support different types of computer equipment so as to give visually impaired people a choice of the machines that best fit their needs. The synthesizers must be designed for commercial applications for sighted or blind people, since it is vocationally more acceptable when everyone uses mainstream equipment.
- 3 The system must be software oriented.
- 4 The program should give the user security, so that when reviewing the screen there is no possibility of altering data (as could happen if you do not use two modes and Home Row function keys).
- 5 The program must load and run automatically, and be usable by both sighted and visually impaired persons. This allows both blind and sighted educators and students to teach each other.
- 6 HELP functions should be integrated into the program, and be accessible while running another program.

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- 7 The Speech Review System must be designed to be transportable, and to run invisibly with the Operating System and applications software.
- 8 The system should be configurable to communicate with other computers, and should require no special cards or non-standard equipment.
- 9 Full use of the extended features of the hardware, both for the computer and the synthesizer, must be observed.
- 10 Above all, the program must run most of the available commercial software that is designed to run under the Operating System, provided the software observes professional programming standards by using the intended system interfaces.

The B. G. MICRO COMPUTALKER SPEECH SYSTEM is available as individual components or as complete systems.

The items available are:

1. Enable Reader 4.0 soft ware interface (public domain)
 4 - 5 1/4 inch floppy disks with software interfaces for the following speech synthesizers:
 - a. Artic Technology - Symphonix Speech Synthesizer
 - b. Digital Equipment Corp. - Dectalk Speech Synthesizer
 - c. Speech Plus - Calltext 5050 Speech Synthesizer
 - d. Street Electronics - Echo GP Speech Synthesizer
 - e. Votrax, Inc. - Votrax PSS, Votalker, & Votrax PSSB \$ 30.00
 2. COMPUTALKER software interface for use with the Votrax PSS version of Enable Reader 4.0, ENABLE_V.EXE. Consists of three drivers that can be selectively loaded or loaded with the batch file ER.BAT:
 - a. ERI14.COM adjusts the RS232 interface of ENABLE_V.EXE to work with the COMPUTALKER Speech Synthesizer.
 - b. FULL.COM provides an audible signal when the speech buffer on the COMPUTALKER is full.
 - c. QKEY.COM provides the capability to stop the speech with the <Q> key when the speech buffer is full. Otherwise the <Q> key acts normally.
 - d. ER.BAT is a batch file that automatically loads the COMPUTALKER drivers and ENABLE_V.EXE programs.
 These special drivers are not Public Domain. \$ 25.00
 3. COMPUTALKER SPEECH SYNTHESIZER \$ 69.95
 4. One foot long RS232 connecting cable to use when installing the COMPUTALKER inside the PC cabinet. \$ 20.00
- \$ 144.95

COMPLETE INTERNAL SYSTEM ITEMS 1,2,3,4 AS ABOVE SPECIAL \$125.00

NOT ENOUGH ROOM IN YOUR PC CABINET FOR ANOTHER BOARD?

5. Special power supply to allow use of the COMPUTALKER outside the computer cabinet or with ANY computer that provides an RS232 serial interface. \$ 19.99
6. RS232 cable 5 feet long for use when the COMPUTALKER is not installed inside the computer cabinet. \$ 25.00

COMPLETE EXTERNAL SYSTEM ITEMS 1,2,3,5,6 VALUE \$ 169.94 SPECIAL \$149.95

7. ENABLE READER 5.0 software set up specially for the COMPUTALKER. The latest version NOT PUBLIC DOMAIN. \$199.95

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